NAVSHIPS 0967-068-6010

TECHNICAL MANUAL

for

POWER SUPPLY PP-1767A/UG

DEPARTMENT OF THE NAVY
BUREAU OF SHIPS

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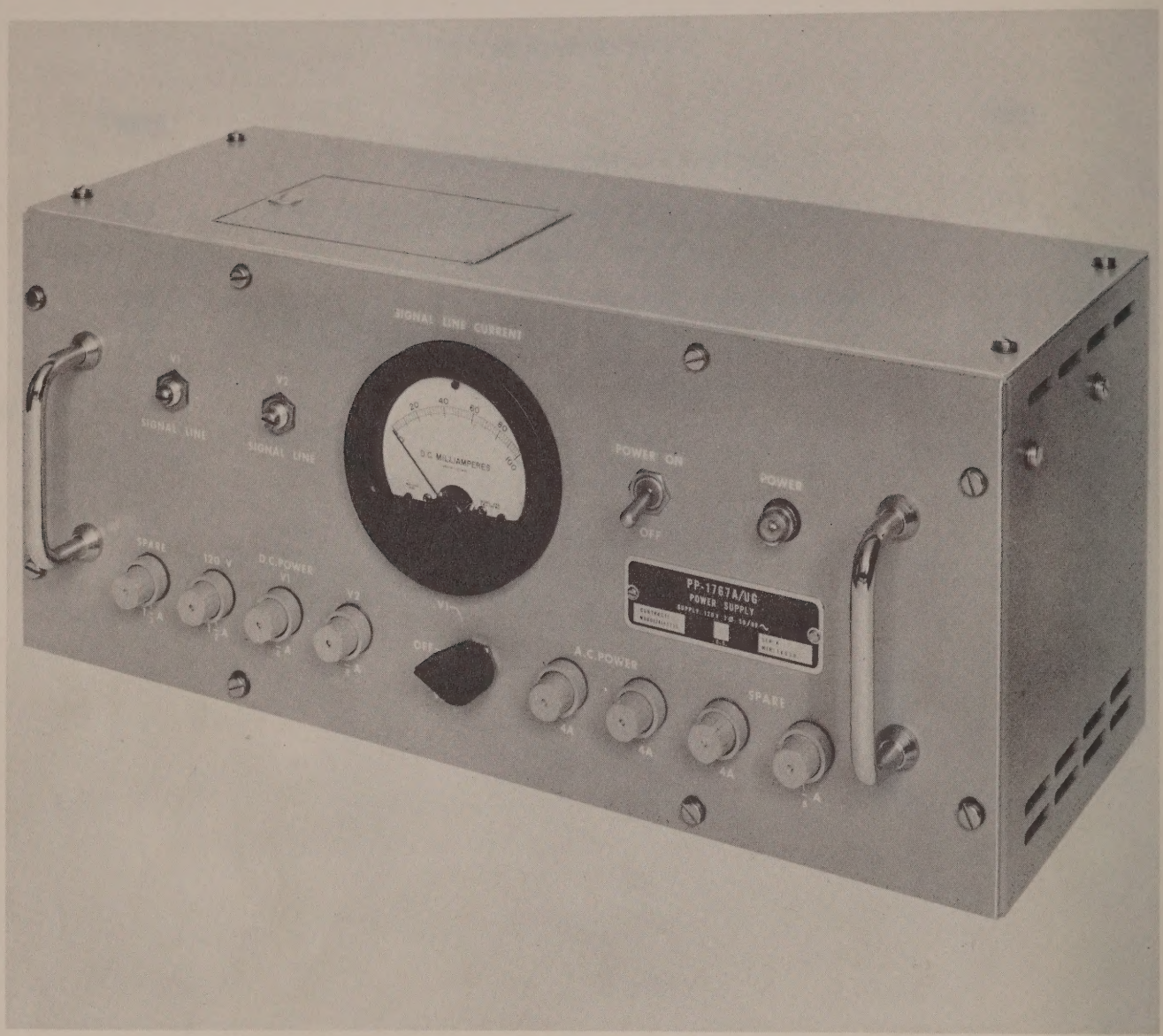


Figure 1-1. Power Supply PP-1767A/UG

SECTION I

GENERAL INFORMATION

1-1. FUNCTIONAL DESCRIPTION

When connected to a source of 120 volts ac, 50/60 cps, Power Supply PP-1767A/UG provides four outputs:

a) 6 volts ac at 0.5 ampere

b) 120 volts dc at 1 ampere, regulated

c) 115 volts dc (no load) at 0.06 ampere, regulated (V1)

d) 115 volts dc (no load) at 0.06 ampere, regulated (V2)

Power Supply PP-1767A/UG is used as a d-c supply for the operation of teletypewriters, radio adaptors, and associated equipments. Figure 1-2 shows the power supply interconnected in a typical radio teletype system.

The power supply utilizes semiconductors throughout (no vacuum tubes) and requires no operational adjustments. The circuit comprises a power transformer, semiconductor full-wave rectifiers, and a d-c voltage regulator consisting of a magnetic amplifier and Zener diode.

1-2. REFERENCE DATA

a) Navy Type: Power Supply PP-1767A/UG

b) Contracts N600(24) 61736 and NObsr-93322

c) Contractor: Digital Electronics, Inc., Westbury, L.I., New York

d) Inspector: Inspector of Naval Material, Garden City, New York

e) Number of Packages: One complete unit per package

f) Cubical Contents: 880 cubic inches (uncrated)

g) Total Weight: 40 pounds (uncrated)

h) Input Requirements: 120 volts, plus or minus 10%, 50 or 60 cps, plus or minus 5%, single phase

i) Output Voltages: 6 vac at 0.5 amp; 120 vdc at 1 amp; 115 vdc (no load) (V1) at 0.06 amp; 115 vdc (no load) at 0.06 amp (V2)

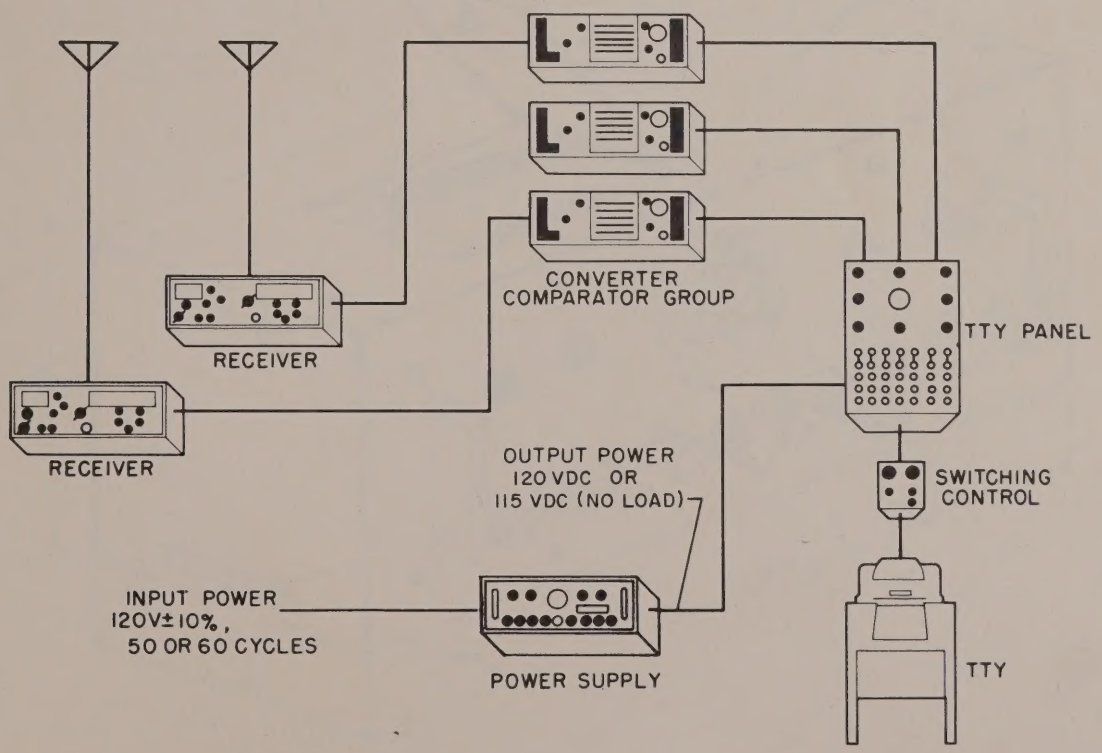


Figure 1-2. Power Supply PP-1767A/UG, System Interconnection Diagram

SECTION II

INSTALLATION

2-1. SITE SELECTION

Power Supply PP-1767A/UG may be located on any shelf, table, deck, or other horizontal surface. Sufficient clearance should be provided to allow adequate ventilation and connection of cables to the top back of the unit.

Figure 2-1, Power Supply PP-1767A/UG Outline Drawing, indicates the over-all dimensions.

2-2. POWER REQUIREMENTS

Power Supply PP-1767A/UG operates from a 120 vac, 50/60 cps, single phase supply. A hinged cover at the top of the unit provides access for cable leads.

2-3. TERMINAL BOARD CONNECTIONS

Figure 2-2 shows the layout of the two terminal boards for connection of all input and output cables. Connect the supply and loads as indicated.

2-4. VOLTAGE AND CURRENT ADJUSTMENTS

a. Adjustment of the 120 vdc output voltage is obtained by means of control R3 (figure 4-2). To adjust R3 loosen the locking nut, turn the shaft with a screwdriver for the desired setting, and re-tighten the locking nut.

b. The output currents for signal lines V1 and V2 may be adjusted similarly by controls R8 and R12, respectively (figure 3-1). Turn switch S2 (figure 3-1) to the line being monitored (V1 or V2) and rotate the appropriate control (R8 or R12) until the desired current is obtained. (To adjust R8 or R12, it is first necessary to loosen the locking nut.) Return switch S2 to the off position after the adjustments are complete.

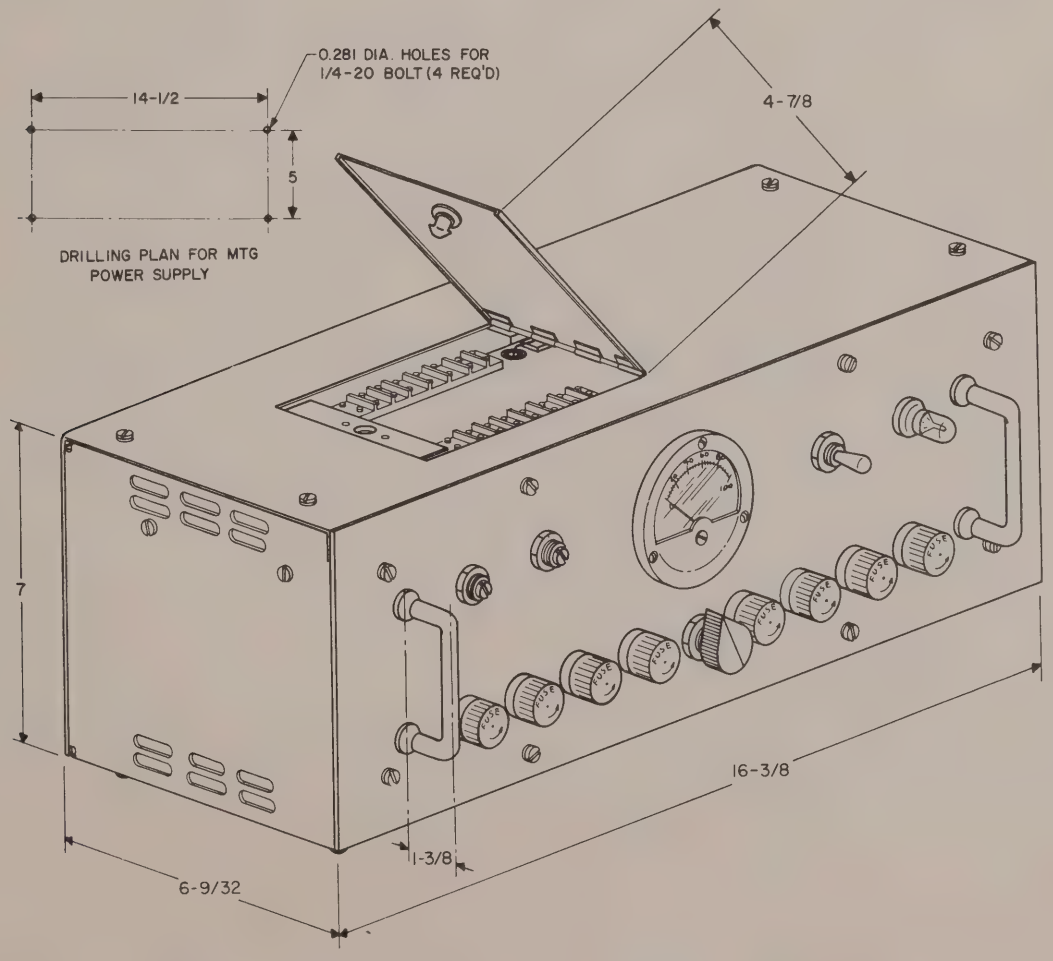


Figure 2-1. Power Supply PP-1767A/UG, Outline Dimensions

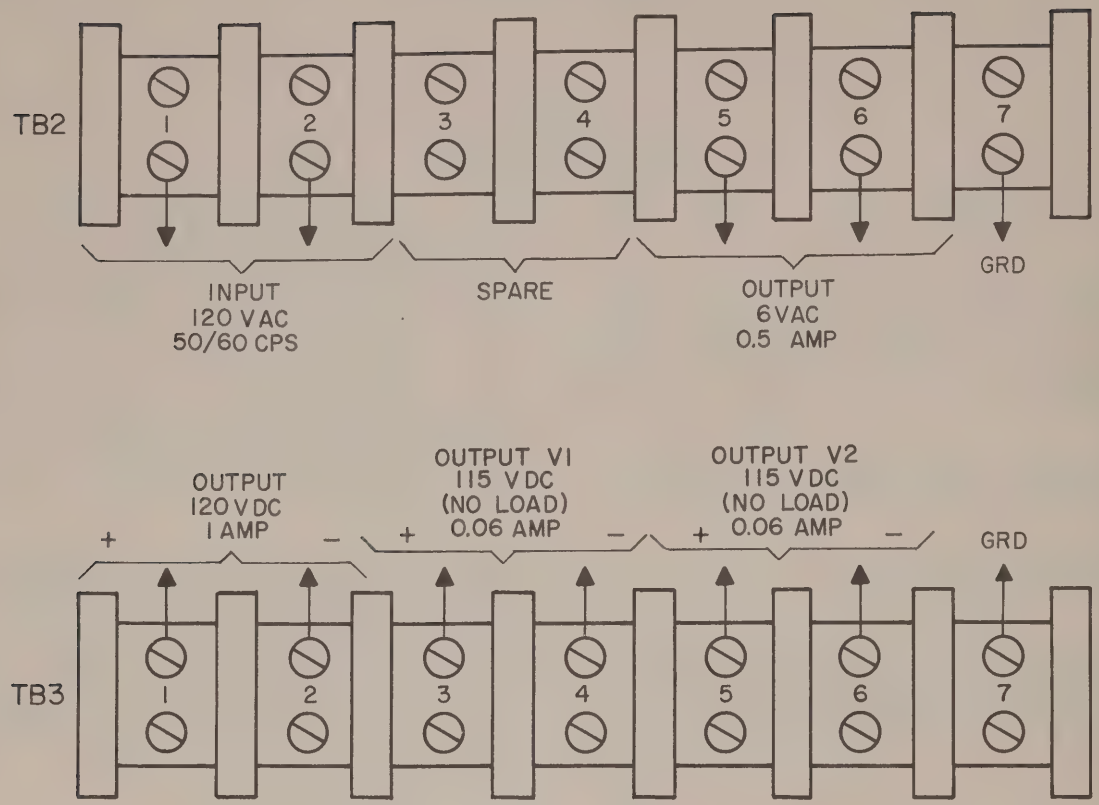


Figure 2-2. Terminal Boards for Input and Output Connections

SECTION III

OPERATION

3-1. OPERATING PROCEDURES

With Power Supply PP-1767A/UG properly connected to an a-c source and d-c loads, and adjusted in accordance with paragraph 2-4, it is energized by placing the a-c power line switch to the ON position. The power light (DS1) should light, indicating that a-c power is available to the power supply.

Figure 3-1 shows the location of the power line switch, power light, meter, adjustment controls, and fuses.

The power supply may be closed down by placing the a-c power line switch (S1) to the OFF position. No other operational or special precautions are necessary.

3-2. OPERATOR'S MAINTENANCE

Power Supply PP-1767A/UG is a simple unit. The operator can make all voltage and/or current adjustments described in paragraph 2-4 and replace defective fuses and the pilot lamp, when required.

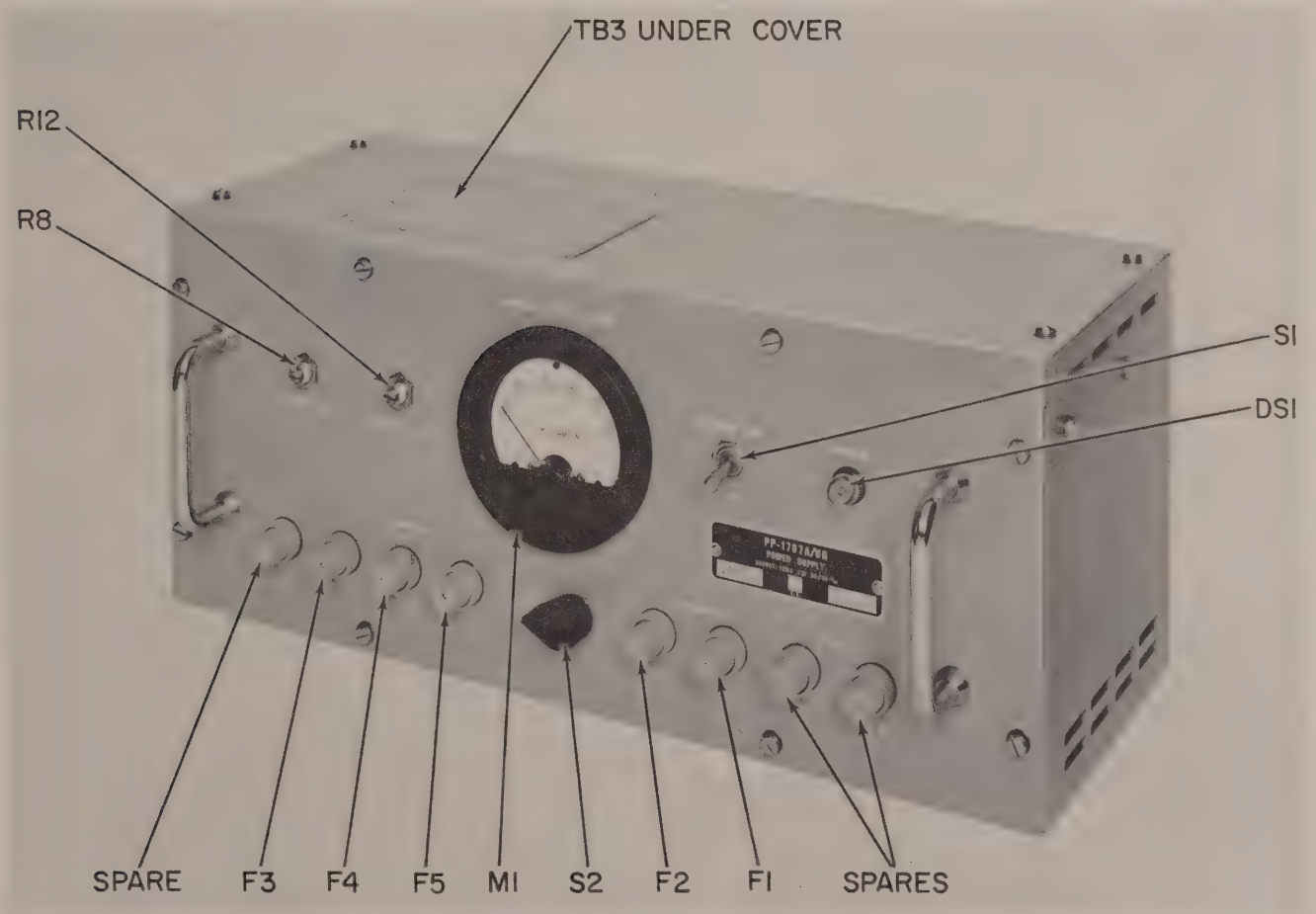


Figure 3-1. Power Supply PP-1767A/UG, Front Panel View

SECTION IV

TROUBLESHOOTING

4-1. FUNCTIONAL DESCRIPTION

Power Supply PP-1767A/UG (see figure 4-3) operates from a 120 vac, 50/60 cps, single phase source connected to terminals 1 and 2 of terminal board TB2.

When POWER ON-OFF switch S1 is thrown to the ON position, input power is applied through line filters C1 and C2, radio frequency interference filter FL1, and AC POWER fuses F1 and F2, lighting POWER indicator DS1. The negative half-cycle of the input voltage is passed through CR2 (the positive half-cycle by CR1) and an input winding of the magnetic amplifier AR1 to the primary of power transformer T1. The magnetic amplifier provides voltage regulation as described below.

The voltage across the primary of transformer T1 is induced across the secondaries, providing outputs of 200 volts (pins 9 and 11), 190 volts (pins 3 and 5, and 6 and 8), and 6 volts (pins 12 and 13).

For the 120-volt output, diodes CR4 and CR5 provide a full-wave rectifier circuit. Capacitor C3 is an rfi suppressor. Filtering is provided by capacitors C4 and C5. Resistor R4 is the main bleeder resistance in series with feedback resistor R3. Bleeder resistor R2 is in parallel with the series bleeder resistors R3 and R4 as a safety precaution. Fuse F3 protects the power supply circuit from a short circuit in the load.

The 120 vdc output is regulated by the magnetic amplifier circuit. Voltage regulation of plus or minus 5% is achieved by varying the degree of saturation of the magnetic amplifier AR1 to compensate for load and line variations. The bias winding of the magnetic amplifier (in series with resistor R1) biases the magnetic amplifier partially into saturation. The bias winding is energized through resistor R1. The control winding of the magnetic amplifier (in series with Zener diode CR3) senses voltage variations in the output and varies the voltage drop across the magnetic amplifier, thereby adjusting the voltage across the primary of transformer T1. The control winding is voltage referenced by Zener diode CR3 and potentiometer R3. Potentiometer R3 is adjusted until the nominal 120v output voltage is reached.

The two 115 vdc (no load) outputs (V1 and V2) utilize identical circuits. Diodes CR6 and CR7 provide a full-wave rectifier circuit. Filtering is provided by capacitor C6 and resistors R5 and R6. Resistor R7 is a current limiting resistor, providing short-circuit protection. Fuse F4 protects the transformer winding from short circuits in the load. Potentiometer R8 permits varying the output current. Note that the two 115 vdc (no load) outputs are essentially constant current sources (from 40 to 80 ma), not constant voltage sources. The output load is usually 65 ohms; therefore, the output voltage (under load) is usually approximately 4 volts when the load is drawing 60 ma.

Switch S2 is a ganged two-section switch with two poles per section. Its three positions are: V1, OFF, and V2. Turning the switch connects SIGNAL LINE CURRENT meter M1 in series with either signal line V1 or V2, monitoring the load current drawn. Potentiometers R8 and R12 provide current adjustments for these two outputs, respectively.

Terminals 5 and 6 of terminal board TB2 provide 6 vac at 0.5 ampere for external pilot lamps.

4-2. LOCALIZING TROUBLES

a. General

If output voltage is absent or incorrect, make the following checks:

1) Observe POWER indicating light DS1 for the presence of input power. If it is lit, proceed to 2) below. If it is not lit, check the input source and AC POWER fuses F1 and F2.

2) Check for the presence of approximately 60 vac at the input to power transformer T1 (terminals 1 and 2). If this voltage is present, proceed to 3) below. If this voltage is not present, check diodes CR1 and CR2, and magnetic amplifier AR1.

3) Check for secondary voltages across transformer T1. If any voltage is improper, disconnect all leads to the particular secondary winding and check the voltage again. If it is still improper, replace the transformer. Table 4-1 lists the correct voltages across each of the windings with loads connected and disconnected. If the secondary voltage is now correct, proceed to the heading below which covers the particular output path being investigated.

b. 120 VDC Output Circuit

1) Check for 120 vdc across C4, C5, or R2. If this voltage is absent or incorrect, check all components in the rectifier circuit: C3, CR4, CR5, C4, C5, R2, R3, and R4.

2) Check for 120 vdc across terminals 1 and 2 of terminal board TB3. If this voltage is absent, check fuse F3.

Table 4-1. Voltages of Transformer Windings

Winding Terminal	Everything Connected Normally To T1	Load Disconnected From Either Terminal			
		3-5	6-8	9-11	12-13
1-2	60 v	60 v	60 v	70 v	62 v
3-5	190 v	190 v	190 v	225 v	200 v
6-8	190 v	190 v	190 v	225 v	200 v
9-11	200 v	200 v	200 v	240 v	210 v
12-13	6 v	6 v	6 v	6 v	6.5 v

Note. Voltages measured with a 10,000 ohms per volt voltmeter, ±5%.

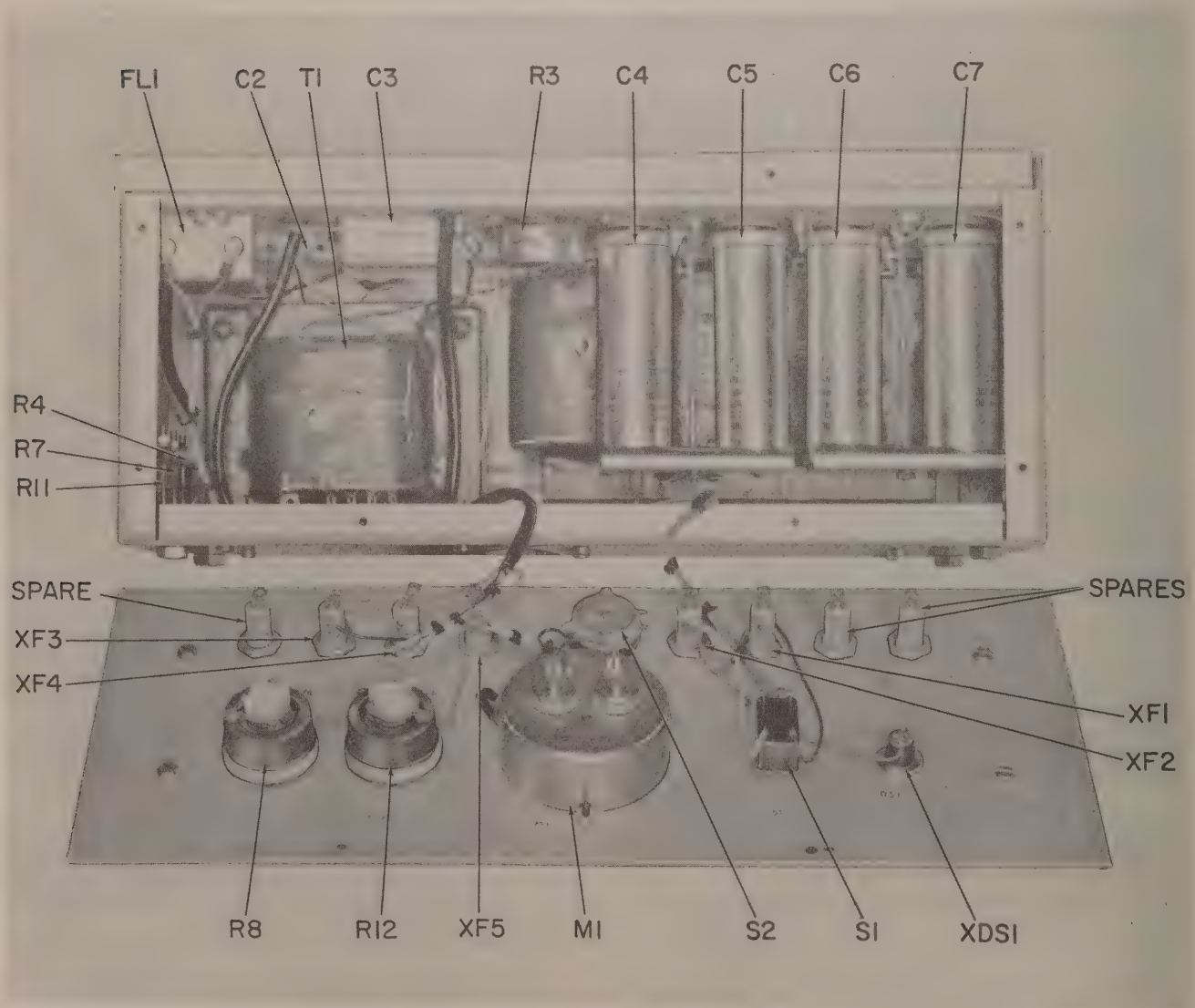


Figure 4-1. Power Supply, Interior View with Front Panel Lowered

c. 115 VDC (No Load) Output Circuit

1) Check for 115 vdc across C6, R5, or R6. If this voltage is absent or incorrect, check all components in the rectifier circuit: CR6, CR7, C6, R5, and R6.

2) Check the voltage across terminals 3 and 4 (or 5 and 6) of terminal board TB3. This output voltage will vary depending on the load across the terminals. Typically, a 65-ohm load drawing 60 ma will produce a voltage of approximately 4 volts across the terminals. If the proper voltage is absent or incorrect, check the voltage drop across the limiting resistors R7 and R8 (or R11 and R12), fuse F4 (or F7), and switch S2.

d. 6 VAC Output Circuit

This voltage is supplied directly from power transformer T1. Remove all leads from terminals 12 or 13 of the transformer and measure the a-c voltage across the terminals. If the measurement is not 6.5 volts ac (plus or minus 5%), replace the transformer (T1).

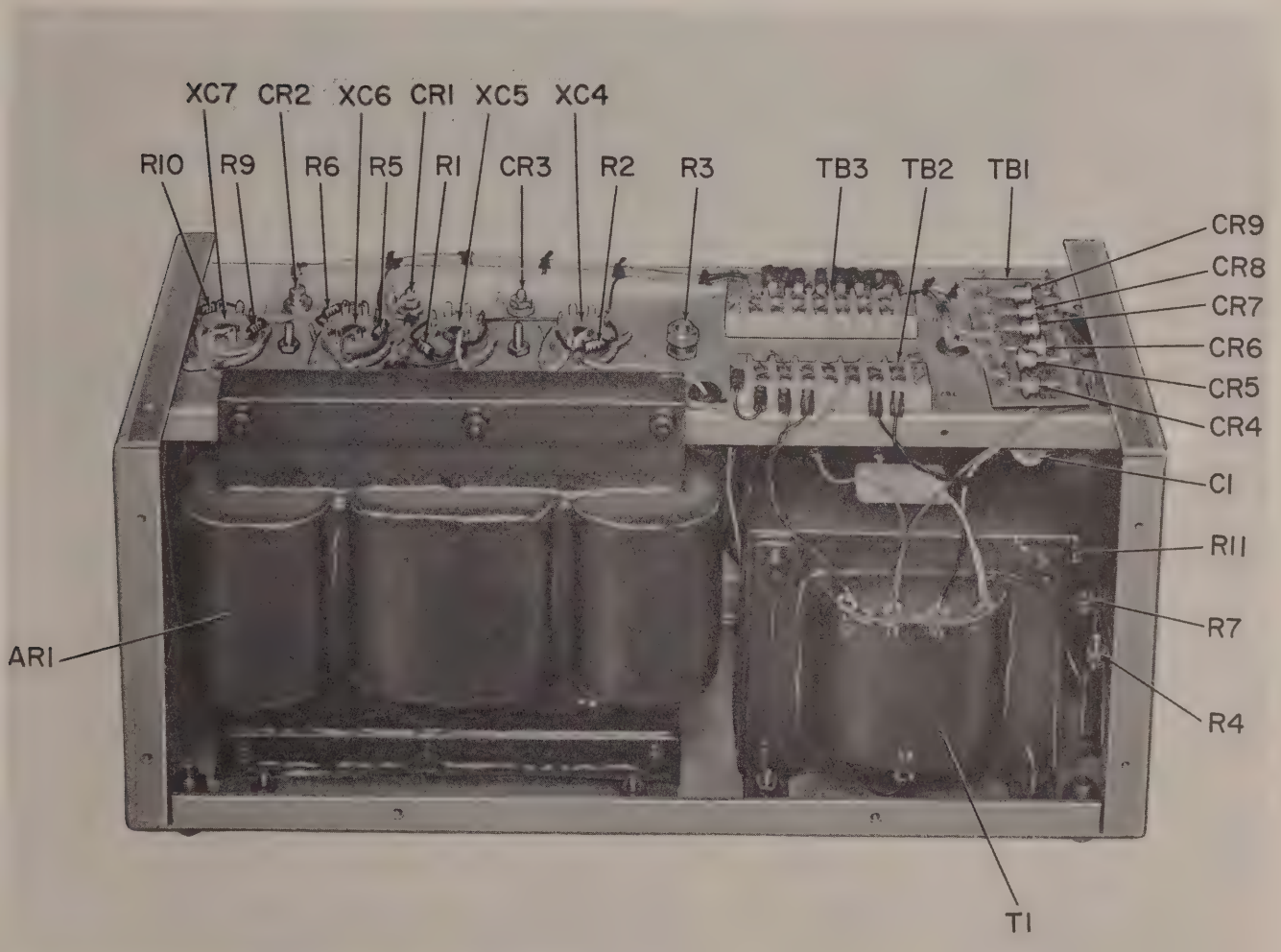
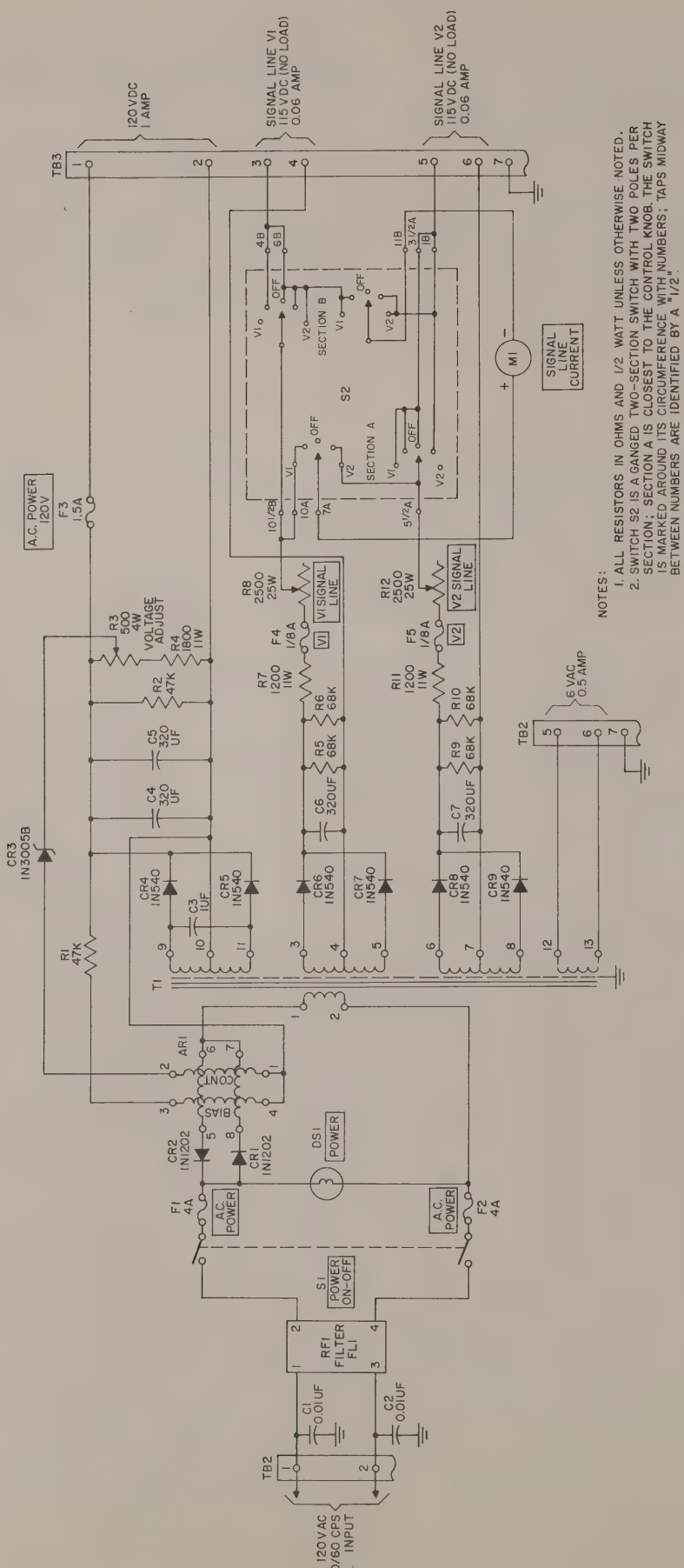


Figure 4-2. Power Supply, Interior View of Top of Unit



NOTES:
1. ALL RESISTORS IN OHMS AND 1/2 WATT UNLESS OTHERWISE NOTED.
2. SWITCH S2 IS A GANGED TWO-SECTION SWITCH WITH TWO POLES PER SECTION; SECTION A IS CLOSEST TO THE CONTROL KNOB. THE SWITCH IS MARKED AROUND ITS CIRCUMFERENCE WITH NUMBERS; TAPS MIDWAY BETWEEN NUMBERS ARE IDENTIFIED BY A "1/2".
3. CAPACITORS C4, C6, AND C7 ARE EACH COMPOSED OF TWO 160UF SECTIONS CONNECTED IN PARALLEL.

Figure 4-3. Power Supply PP-1767A/UG, Schematic Diagram

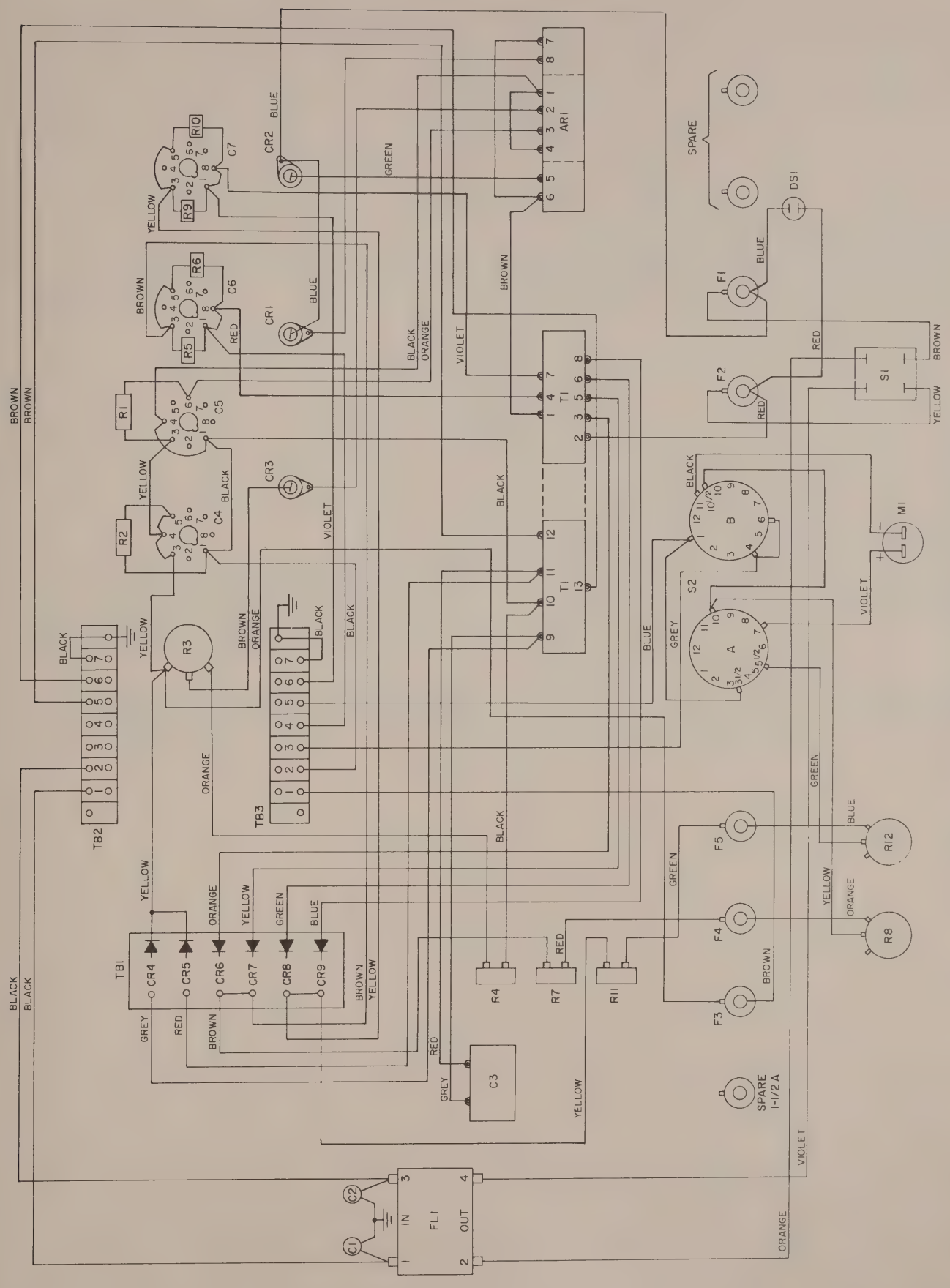


Figure 4-4. Power Supply PP-1767A/UG, Wiring Diagram

SECTION V

MAINTENANCE

5-1. PREVENTIVE MAINTENANCE

All voltage and current adjustments are described in paragraph 2-4. No other preventive maintenance is required.

5-2. REPAIRS

Figures 3-1, 4-1 and 4-2 show the location of all parts. Figures 4-3 and 4-4 are the schematic and wiring diagrams, respectively. Circuit continuity and test points may be determined readily from these figures.

SECTION VI

PARTS LIST

6-1. INTRODUCTION

a. Reference designations are used to identify all maintenance parts of the equipment. They are used for marking the equipment, adjacent to the part they identify, and are included on the drawings, photographs, diagrams, and parts list.

b. Stock numbers of parts used in this equipment may be obtained by referring to the Allowance Parts List (APL) published by ESO.

6-2. MAINTENANCE PARTS LIST

Table 6-1 lists the maintenance parts for Power Supply PP-1767A/UG. Column 1 lists the reference designation of the various parts in alpha-numerical sequence. Column 2 lists the name and description of the various items. Column 3 lists the appropriate illustration showing the location of the item.

6-1. LIST OF MANUFACTURERS

Table 6-2 lists the manufacturers of parts used in the equipment. Column 1 indicates the code number used to identify the manufacturer.

Table 6-1. Maintenance Parts List

Reference Symbol	Description	Mfr's Code No.	Locating Figure
AR1	Amplifier, Magnetic: P/N BE-0899, type TF55X40ZZ, Mil-T-27A	97520	4-2
C1	Capacitor, Fixed, Ceramic: 0.01 uf, 500 vdc, Mil type CK63AW103M	81349	4-2
C2	Same as C1		4-1
C3	Capacitor, Fixed, Paper: 1 uf, 330 vac peak, P/N D1705-13	83125	4-1
C4	Capacitor, Fixed, Dry Electrolytic: dual section, 160 uf per section, 150 wvdc, Mil type CE52C161J	96906	4-1
C5	Same as C4		4-1
C6	Same as C4		4-1
C7	Same as C4		4-1
CR1	Rectifier, Semiconductor: JAN 1N1202	96906	4-2
CR2	Same as CR1		4-2
CR3	Reference, Voltage: JAN 1N3005B	96906	4-2
CR4	Rectifier, Semiconductor: JAN 1N540	96906	4-2
CR5	Same as CR4		4-2
CR6	Same as CR4		4-2
CR7	Same as CR4		4-2
CR8	Same as CR4		4-2
CR9	Same as CR4		4-2
DS1	Lamp, Glow: JAN NE-2D	96906	3-1
F1	Fuse, Cartridge: 250 v, 4 amperes, Mil type FO2A250V-4A	96906	3-1
F2	Same as F1		3-1
F3	Fuse, Cartridge: 250v, 1.5 amperes, Mil type FO2A250V-1.5A	96906	3-1
F4	Fuse, Cartridge: 250 v, 1/8 ampere, Mil type FO2A250V-1/8A	96906	3-1
F5	Same as F4		3-1
FL1	Filter, Radio-Frequency: P/N FA10506	81831	4-1
M1	Meter, Milliammeter: 0-100 ma dc, Mil type MR36W100DCMAR	96906	3-1
MP1	Knob: for switch S2, Mil type MS91528-1P2B	96906	3-1

Table 6-1. Maintenance Parts List (Cont'd)

Reference Symbol	Description	Mfr's Code No.	Locating Figure
R1	Resistor, Fixed, Composition: 47K, 1/2w, Mil type RC20GF473K	96906	4-2
R2	Same as R1		4-2
R3	Resistor, Variable, Wirewound: 500 ohms, 4w, Mil type RA30LASB501A	96906	4-1
R4	Resistor, Fixed, Wirewound: 1.8K, 11w, Mil type RW29V182	96906	4-1
R5	Resistor, Fixed, Composition: 68K, 1/2w, Mil type RC20GF683K	96906	4-2
R6	Same as R5		4-2
R7	Resistor, Fixed, Wirewound: 1.2K, 11w, Mil type RW29V122	96906	4-2
R8	Resistor, Variable, Power: 2.5K, 25w, Mil type RP101SA252KK	96906	3-1
R9	Same as R5		4-2
R10	Same as R5		4-2
R11	Same as R7		4-1
R12	Same as R8		3-1
S1	Switch, Toggle: DPST, Mil type MS25100-22	96906	3-1
S2	Switch, Rotary: P/N 349-111	71450	3-1
T1	Transformer, Power: P/N BE-0898, type TF55X03ZZ, Mil-T-27A	97520	4-1
TB1	Terminal Board: P/N 349-C-109	18038	4-2
TB2	Terminal Board: Mil type 37TB7	96906	4-2
TB3	Same as TB2		4-2
XC4	Socket, Octal: Mil type TS101P02	96906	4-2
XC5	Same as XC4		4-2
XC6	Same as XC4		4-2
XC7	Same as XC4		4-2
XDS1	Lampholder: Mil type LH74LC13CN	96906	4-1
XF1	Fuseholder: Mil type FHN20G	96906	4-1
XF2	Same as XF1		4-1
XF3	Same as XF1		4-1
XF4	Same as XF1		4-1
XF5	Same as XF1		4-1

Table 6-2. List of Manufacturers

Code No.	Manufacturer
18038	Digital Electronics, Inc., Westbury, N. Y.
71450	CTS Corporation, Chicago, Ill.
81349	Military Specification
81831	Filtron Co., Inc., Flushing, N. Y.
83125	General Instrument, Capacitor Div., Darlington, So. Carolina
96906	Military Standard
97520	Basler Electric Co., Highland, Ill.

USER ACTIVITY COMMENT SHEET

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